

## Zheng-Tian Lu (August 18, 2004)

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### Degrees Attained:

Ph. D., 1994, University of California at Berkeley;  
M. S., 1991, University of Chicago;  
B. S., 1987, University of Science and Technology of China.

### Employment History:

2004 – Present, Professor (part-time), University of Chicago;  
2000 – Present, Physicist, Argonne National Laboratory;  
1997 – 2000, Assistant Physicist, Argonne National Laboratory;  
1994 – 1997, Research Associate, JILA, University of Colorado;  
1991 – 1994, Research Assistant, Lawrence Berkeley National Laboratory;  
1988 – 1991, Research Assistant, Argonne National Laboratory;  
1987 – 1988, Teaching Assistant, University of Chicago.

### Research Interests:

Ultrasensitive trace-isotope analysis;  
Low-energy tests of fundamental symmetries;  
Laser spectroscopy of exotic atoms.

### Awards:

U. S. Presidential Early Career Award for Scientists and Engineers (2000);  
U. S. DOE Office of Science Early Career Scientist and Engineer Award (2000).

### Professional Associations:

Member, American Physical Society;  
Member, American Association for the Advancement of Science.

## **Invited Publications:**

Tracing Noble Gas Radionuclides in the Environment

P. Collon, W. Kutschera and Z.-T. Lu

Annual Review of Nuclear and Particle Science, Vol. **54**, in press (2004)

Searches for stable strangelets in ordinary matter: overview and a recent example

Z.-T. Lu, R. J. Holt, P. Müller, T. P. O'Connor, J. P. Schiffer, L.-B. Wang

Nuclear Physics A, in press (2004)

Laser-Based Methods for Ultrasensitive Trace-Isotope Analyses (*Feature review article*)

Z.-T. Lu and K.D.A. Wendt

Review of Scientific Instruments **74**, 1169 (2003)

Atom Trap Trace Analysis

Z.-T. Lu

*McGraw-Hill 2002 Yearbook of Science and Technologies* (2002)

From Helium-6 to Krypton-81

Z.-T. Lu

*Art and Symmetry in Experimental Physics, Festschrift for Eugene D. Commins*

AIP Conference Proceedings 596 (2001)

Atom Trap Trace Analysis

Z.-T. Lu, K. Bailey, C.Y. Chen, X. Du, Y.-M. Li, T.P. O'Connor, L. Young

*Atomic Physics 17*, edited by E. Arimondo, P. DeNatale and M. Inguscio (AIP, 2001)

An Efficient Vapor Cell Magneto-Optical Trap of  $^{221}\text{Fr}$  atoms

Z.-T. Lu, K.L. Corwin, K.R. Vogel, C.E. Wieman, T.P. Dinneen, J. Maddi and H. Gould

*Laser Spectroscopy XIII*, edited by Z. Wang, Z. Zhang and Y. Wang (World Scientific, 1997)

## **Contributed Publications:**

Measurement of the fine-structure splitting of the  $1s2p\ ^3P_{0,1,2}$  levels of helium

P. Mueller, L.-B. Wang, R.J. Holt, Z.-T. Lu, G.W.F. Drake

In preparation (2004)

Laser spectroscopic determination of the  $^6\text{He}$  nuclear charge radius

L.-B. Wang, P. Mueller, K. Bailey, G.W.F. Drake, J.P. Greene, D. Henderson, R.J. Holt, R.V.F. Janssens, C.L.

Jiang, Z.-T. Lu, T.P. O'Connor, R.C. Pardo, K.E. Rehm, J.P. Schiffer, and X.D. Tang

Physical Review Letters, in press (2004)

An atom trap system for practical  $^{81}\text{Kr}$ -dating

X. Du, K. Bailey, Z.-T. Lu, P. Mueller, T.P. O'Connor, L. Young

Review of Scientific Instruments, in press (2004)

One million year old groundwater in the Sahara revealed by krypton-81 and chlorine-36

N. C. Sturchio, X. Du, R. Purtschert, B. E. Lehmann, M. Sultan, L. J. Patterson, Z.-T. Lu, P. Mueller, K.

Bailey, T. P. O'Connor, L. Young, R. Lorenzo, B. M. Kennedy, M. van Soest, Z. El Alfy, B. El Kaliouby, Y.

Dawood, and A. M. A. Abdallah

Geophysical Research Letters **31**, L05503 (2004)

Counting individual  $^{41}\text{Ca}$  atoms with a Magneto-Optical Trap

I. D. Moore, K. Bailey, J. Greene, Z.-T. Lu, P. Mueller, T. P. O'Connor, Ch. Geppert, K. D. A.

Wendt, L. Young

Physical Review Letters **92**, 153002 (2004)

Search for anomalously heavy isotopes of helium in the Earth's atmosphere

P. Mueller, L.-B. Wang, R. J. Holt, Z.-T. Lu, T. P. O'Connor, and J. P. Schiffer

Physical Review Letters **92**, 022501 (2004)

A new method of measuring  $^{81}\text{Kr}$  and  $^{85}\text{Kr}$  abundances in environmental samples

X. Du, R. Purtschert, K. Bailey, B. E. Lehmann, R. Lorenzo, Z.-T. Lu, P. Mueller, T. P. O'Connor,

N.C. Sturchio, and L. Young

Geophysical Research Letters **30**, 2068 (2003).

Laser spectroscopic measurement of helium isotope ratios

L.-B. Wang, P. Mueller, R. Holt, Z.-T. Lu, T.P. O'Connor, Y. Sano, N.C. Sturchio

Geophysical Research Letters **30**, 1592 (2003)

Towards ultrahigh sensitivity analysis of  $^{41}\text{Ca}$

I.D. Moore, K. Bailey, Z.-T. Lu, P. Mueller, T.P. O'Connor, L. Young

Nuclear Instruments and Methods in Physical Research **B204**, 701 (2003)

Towards measuring the charge radius of  $^6\text{He}$  and  $^8\text{He}$

P. Mueller, L.-B. Wang, K. Bailey, G.W.F. Drake, X. Du, J. Greene, A.M. Heinz, R.J. Holt, D. Henderson, R.V. Janssens, C.-L. Jiang, C. Law, Z.-T. Lu, I.D. Moore, T.P. O'Connor, R.C. Pardo, M. Paul, T. Pennington, K.E. Rehm, J.P. Schiffer

Nuclear Instruments and Methods in Physical Research **B204**, 536 (2003)

A Beam of Metastable Krypton Atoms Extracted from an RF-Driven Discharge

C.Y. Chen, K. Bailey, X. Du, Y.M. Li, Z.-T. Lu, T.P. O'Connor, L. Young, G. Winkler

Review of Scientific Instruments **72**, 271 (2001)

ATTA -- a new method of ultrasensitive isotope trace analysis

K. Bailey, C.Y. Chen, X. Du, Y.M. Li, Z.-T. Lu, T.P. O'Connor, L. Young

Nuclear Instruments and Methods in Physics Research **B172**, 224 (2000)

Atom Trap Trace Analysis

K. Bailey, C.Y. Chen, X. Du, Y.M. Li, Z.-T. Lu, T.P. O'Connor, L. Young

Hyperfine Interactions **127**, 515 (2000)

Ultrasensitive isotope trace analyses with a magneto-optical trap

C.Y. Chen, Y.M. Li, K. Bailey, T.P. O'Connor, L. Young, Z.-T. Lu

Science **286**, 1139 (1999)

Frequency-stabilized diode laser with the Zeeman shift in an atomic vapor

K.L. Corwin, Z.-T. Lu, C.F. Hand, R.J. Epstein, and C.E. Wieman

Applied Optics, **37**, 3295 (1998)

Efficient collection of  $^{221}\text{Fr}$  atoms into a vapor cell magneto-optical trap

Z.-T. Lu, K.L. Corwin, K.R. Vogel, C.E. Wieman, T.P. Dinneen, J. Maddi and H. Gould  
Physical Review Letters, **79**, 994 (1997)

Low-velocity intense source of atoms from a magneto-optical trap  
Z.-T. Lu, K.L. Corwin, M.J. Renn, M.H. Anderson, E.A. Cornell, and C.E. Wieman  
Physical Review Letters, **77**, 3331 (1996)

Comparison of the cold-collision losses for laser-trapped sodium in different ground-state hyperfine sublevels  
S.-Q. Shang, Z.-T. Lu and S.J. Freedman  
Physical Review A, **50**, R4449 (1994)

Laser trapping of short-lived radioactive isotopes

Z.-T. Lu, C.J. Bowers, S.J. Freedman, B.K. Fujikawa, J.L. Mortara, S-Q. Shang, K.P. Coulter, and L. Young  
Physical Review Letters, **72**, 3792 (1994)

**Patents:**

System and a Method for Frequency-Stabilizing a Diode Laser  
K.L. Corwin, Z.-T. Lu, C.F. Hand, R.J. Epstein, C.E. Wieman  
U.S. Patent Number 6,009,111 (December 28, 1999)

## **Invited Talks, Seminars, Colloquia 2000**

### *Atom Trap Trace Analysis*

Physics Colloquium, University of Illinois at Chicago, February 2000.

### *Ultrasensitive Trace-Isotope Analysis with a Magneto-Optical Trap*

The 17th International Conference on Atomic Physics (ICAP2000), Florence, Italy, June 2000.

### *Progress Report on ATTA*

Physics Division Seminar, Argonne National Laboratory, September 2000.

### *Catching Rare Atoms with Light*

Particle and Nuclear Physics Colloquium, MIT, November 2000.

## **2001**

### *Catching Rare Atoms with Light*

Physics Colloquium, Georgia Institute of Technology, January 2001;

Physics Colloquium, University of Michigan, February 2001;

Atomic Physics Seminar, GSI, Germany, March 2001;

Atomic Physics Seminar, University of Mainz, Germany, March 2001;

The 7th Euro-Conference on Atomic, Molecular, and Optical Physics, Berlin, Germany, April 2001;

ComminsFest 2001, UC Berkeley, May, 2001;

American Chemical Society regional meeting, Michigan, June 2001;

2001 International Symposium on Isotopomers, Yokohama, Japan, July 2001;

Chemistry Division Seminar, Argonne National Laboratory, September 2001.

## **2002**

### *Catching Rare Atoms with Light*

LASE2002, San Jose, January 2002;

Chemistry Division Colloquium, Los Alamos National Laboratory, January 2002.

### *Atom Trap, Krypton-81, and Egypt*

Physics Colloquium, University of Illinois at Chicago, October 2002.

## **2003**

### *Atom Trap, Krypton-81, and Egypt*

Physics Division Seminar, Argonne National Laboratory, January 2003;

Physics Colloquium, University of Chicago, February 2003;

Physics Colloquium, Colorado State University, September 2003;

Physics Colloquium, University of Colorado, September 2003;

Seminar, Geophysics Group, Niels Bohr Institute, September 2003.

Physics Colloquium, Old Dominion University, October 2003;

Annual meeting of Division of Nuclear Physics, American Physical Society, Tucson, October 2003;

Physics Colloquium, Rice University, November 2003;

Physics Colloquium, University of Manitoba, November 2003.

### *Trapping Radioactive Isotopes of Alkaline-Earth Atoms*

The 2<sup>nd</sup> Workshop on Cold Alkaline-Earth Atoms, Copenhagen, Denmark, September 2003.

### *Search for Stable, Strange Particles on Earth*

VIII International Conf. on Hypernuclear & Strange Particle Physics, Newport News, October 2003.

**2004**

*Atom Trap, Krypton-81, and Egypt*

Physics Colloquium, Argonne National Laboratory, January 2004;

*Atom Trap, Krypton-81, and Saharan Water*

Geochemistry Seminar, Lamont-Doherty Earth Observatory, April 2004;

Atomic/Nuclear Physics Seminar, Yale University, April 2004;

Physics Seminar, Qinghua University, Beijing, April 2004

International Workshop on Laser Methods in the Study of Nuclei, Atoms and Molecules (LASER2004),

Poznan, Poland, May 2004;

International Conference on Physics Education and Frontier Research, Shanghai, China, June 2004;

International Symposium on Cold Atom Physics, Lushan, China, July 2004.

*Helium: Probing the exotic and searching for the strange*

Nuclear/Atomic Physics Seminar, Yale University, April 2004;

Physics Seminar, Qinghua University, April 2004.

*Counting Individual  $^{41}\text{Ca}$  Atoms with a MOT*

$^{41}\text{Ca}$  Forum, Experimental Biology 2004, Washington DC, April 2004.

*Laser Spectroscopic Determination of the Nuclear Charge Radius of  $^6\text{He}$*

International Conf. on Precision Physics of Simple Atomic Systems, Rio de Janeiro, Brazil, August 2004;

3<sup>rd</sup> RIA summer school on exotic beam physics, Argonne, August 2004.